Split-window Precipitable Water Product

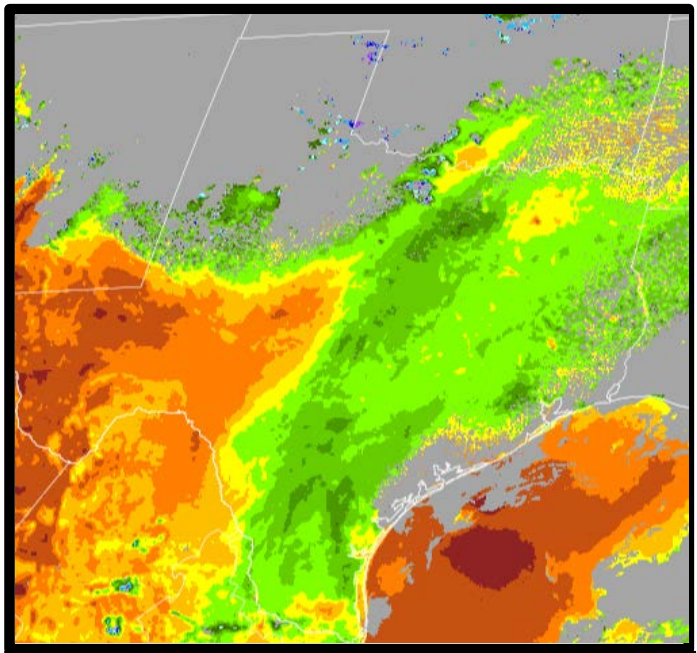
Quick Guide

Why is the Split-window Precipitable Water (SPW) product important?

The SPW product measures precipitable water near the earth's surface using the GOES ABI. With a temporal resolution of 5 min., the product is useful for following rapidly evolving events (i.e., convective). The SPW product monitors moisture gradients and moisture pooling in clear sky regions prior to convective initiation.

How is the SPW product made?

The SPW product is similar to the split-window difference (SWD) product, however it extends beyond that by making use of the 11.2 µm band as well. A set of equations is used to calculate the low-level PW more accurately than the SWD, resulting in a better depiction of the near-surface moisture distribution. SPW is provided in mm of PW (rather than a brightness temperature difference from the SWD) over the CONUS sector from GOES-16.



Split-window Precipitable Water (SPW) at 1901 UTC, 3 May 2021.

Bands used	Time resolution	Spatial resolution (nadir)	Units of PW
10.3, 11.2, and 12.3 µm	5 minutes	2 km	mm

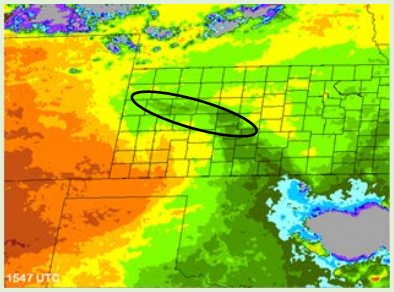
Default color table (mm)

Impact on Operations

Applications to forecasting convection:

- **Surface boundaries**
  - **Dryline**
  - **Outflow boundaries**
  - **Frontal zones**
- **Areas of enhanced moisture before clouds appear:**

Ellipse denotes moisture pooling 75 min. prior to clouds and convective Initiation in Kansas



Limitations

Missing data in cloudy regions: Retrievals are made only in clear sky conditions. Cloudy regions are masked out in gray:

Daytime use only over land: Research is ongoing to create nighttime imagery over land.

Dust: May interfere with moisture signal since this includes a SWD, still being researched.

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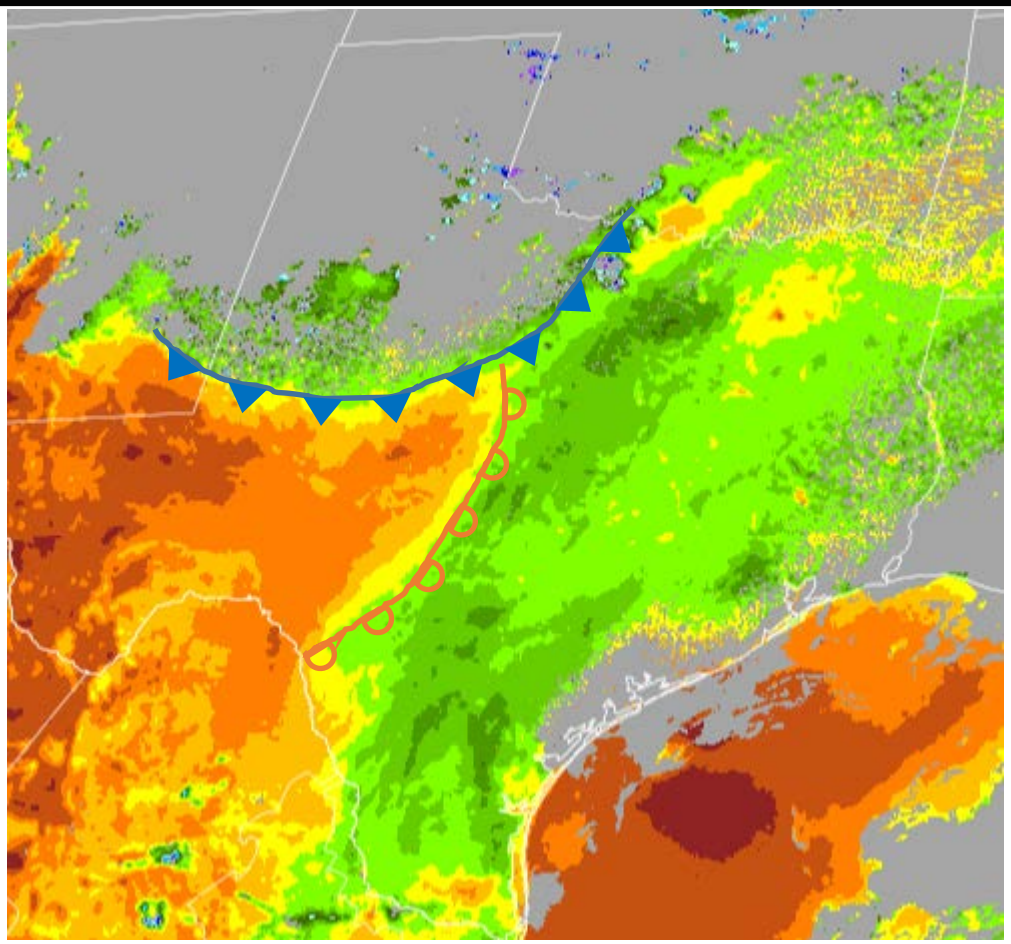

Split-window Precipitable Water (SPW) at 1901 UTC, 3 May 2021.

Because the product is created from split-window channels, the precipitable water is representative of the low-levels, the surface to (generally) 1.5 km. The depth of this layer does vary, however, depending on the exact shape of the weighting functions. There will therefore be a correlation, but not an equivalence, to the precipitable water from the surface to 1.5 km as measured by a radiosonde or calculated by a numerical weather prediction model.

This product shows differences over land and over bodies of water. Note in the accompanying image the dryline and cold front (marked with conventional symbols) in Texas from 1901 UTC 3 May 2021. The moisture distribution seen in the SPW product was confirmed by surface station observations and subsequent cloud development. The product, however, indicates a rather dry low-level atmosphere over the Gulf of Mexico. This is likely due to differences in surface/air temperature contrasts over land and water and its affect on the retrieval of low-level precipitable water, but is still under investigation.

Dostalek, J.F., L.D. Grasso, Y.-J. Noh, T.-C. Wu, J.W. Zeitler, H.G. Weinman, A.E. Cohen, and D.T. Lindsey, 2021: Using GOES ABI Split-Window Radiances to Retrieve Daytime Low-Level Water Vapor for Convective Forecasting. *Electronic J. Severe Storms Meteor.*, **16**(2), 1-19. https://www.ejssm.org/ojs/index.php/ejssm/article/view/182/131

Resources

SPW Product available on SLIDER 2 (noaa.gov domain)
https://rammb-slider2.cira.colostate.edu/

GOES-16 -> CONUS sector -> Split-window Precipitable Water

QuickGuide for Split-window Difference product:

http://cimss.ssec.wisc.edu/goes/OCLOFactSheetPDFs/ABIQuickGuide_SplitWindowDifference.pdf

Hyperlinks not available when viewing material in AIR Tool